AN AUTOCHROME PROCESS TRY-OUT

Made during the Hand Emulsion Primitive Colour Seminar at WORM Filmwerkplaats, Rotterdam. (27 June – 1 July 2016)

FWP AUTOCHROME ATELIER

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One of the topics of the Handmade Emulsion Primitive Colour Seminar was re-engineering the Autochrome process, an early colour method invented by the Lumière brothers. Try-outs of substitutes were made (on some of the originally-used, difficult to find, or toxic, chemicals.)

The Autochrome is a direct positive (additive) colour photography process invented by the Lumière brothers in 1903. Autochrome plates were created by coating a sheet of glass with microscopic potato starch grains dyed red, green, and blue. These formed a screen of colour particles. Carbon or lamp black was applied over the plate, filling in the spaces around the starch grains. Then a (panchromatic) silver gelatin emulsion was applied over the colour screen. When the plate was exposed, the base side was turned toward the subject being photographed, and the colour screen acted as a filter over the emulsion. The as B&W reversal developed plate rendered a positive colour image with delicate colour qualities.

INGREDIENTS:
- Potato starch
- Food dyes
- Art dyes
- Chemical dyes
- Carbon powder
- Estar-based clear leader with subbing layer.

FOOD DYE WITH POTATO STARCH

FOOD COLOURANT (Badia Food Colours and Easter egg dyes):
- Red – Green – Blue

- 7 ml of colourant for 7 g of potato starch
- Reduce (heated) on hot plate until all water evaporated temperature at 35 degrees Celsius.
- Each coloured starch is reduced and then grounded to the finest possible powder with a mortar and pestle. Then three colours are combined and ground again together to achieve best even combination of colours. When the mixture has proper distribution of colour it has a dark grey tone.

ART PIGMENT:
- ULTRAMARINE BLUE 100 GRAM PB29 (V.O.F. VERFMOLEN 'DE KAT):
  2 grams for 7 g of potato starch
  + 6 ml of distilled water
- REMBRANDT WATER COLOUR ALIZARIN CRIMSON RED 326 (SERIES 2):
  2.6 grams for 7 grams of potato starch
  + 6 ml distilled water
- REMBRANDT WATER COLOUR PHTALO GREEN 675 (SERIES 2):
  2.6 grams for 7 grams of potato starch
  + 6 ml distilled water
- Chemical Dyes (for microscopy)
- Methylene Blue (powder)
  2 grams for 7 g of potato starch
  + 6ml of distilled water
- Brilliant Green (C.I. 42040) (for microscopy)
  2 grams for 7 g of potato starch +
  6ml of distilled water
- Rhodamine B
- Varnish

VARNISHING

1ST VARNISH (Maddox Style Recipe Replacement) R1A

Liquid latex	0.75 g
Methyl Ethyl Ketone	50 ml

1ST VARNISH (Maddox Style Recipe Replacement) R1B

Liquid latex	0.375 g
Acetone	25 ml

2ND VARNISH (Maddox Style recipe replacement 1) R2A

Kryolan Collodion	2.2 g
Etos nail polish remover (ethyl acetate based)	4.6 g

2ND VARNISH (Maddox Style recipe replacement 2) R2B

Kryolan Collodion	2.2 g
Acetone	4.6 g

2ND VARNISH (Maddox Style replacement 3) R3
– Failed; cracks. It's rigid. Needs to be flexible.
Kryolan Collodion

1ST VARNISH (Acrylic Replacement)
Winsor & Newton Galeria Acrylic Mediums Matt Varnish
TriArt mfg glazing medium
– Failed starch doesn't stick to film base

2ND VARNISH (Acrylic Replacement) – Failed
Winsor & Newton Galeria Acrylic Mediums Matt Varnish

1ST VARNISH (Spray Glue Replacement)
4 Art Studio Lijmspray 400 ml can

2ND VARNISH (Oil Paint Varnish Replacement)
Talens Dammar Varnish Matt (75 ml bottle)

1ST VARNISH (Fixative Replacement)
Spectra Fix Fixative
– Too watery, no adhesion properties.
Talens Charcoal Fixative 75ml bottle
– No adhesion properties.

2ND VARNISH (Sprayed On Film Replacement)
Lukas Sprühfilm Matt

1ST TEST
Food Colourant Potato Starch
Carbon powder
1st varnish – Acrylic glazing medium
2nd Varnish – Kryolan collodium

Strip of 16mm film with potato starch mixed with RGB food colourants. Pressed once between two pieces of cardboard and with a strip of 35mm as protective surface. Then used carbon black powder to fill in gaps. Pressed twice. Used acrylic glazing medium as 1st varnish and kryolan collodium as second varnish.

PRESSING COLOURED POTATO STARCH ON 16MM

REMARKS: Collodium holds the starch but cracks. Glazing medium does not hold starch onto base. RGB starch mixture was too dense on the 16mm base. Too many layers of starch stacked on top of each other. For it to work we must create a single layer of evenly distributed RGB grains that is still translucent to the eye.

2ND TEST
Food Colourant Potato Starch
1st Varnish Studio glue spray
2nd Varnish Dammar Oil Paint Varnish
Coating on Subbing layer

Favouring green. Pressed through two metal plates. Increase colour recognition to the eye after pressing. Colour clumping and gaps in the RGB lattice.

WATER RESISTANCE TEST 2: Strip of 6 frames place in water. Dye loss after 1 minute. Considerable green dye loss after 4 minutes. Low water resistance. After 20 minutes most colour is lost. Probably not appropriate for use with chemistry.

3RD TEST
Art Pigment Potato Starch
1st Varnish Studio Glue Spray
2nd Varnish Lukas Spruhfilm
Sub Layer coating

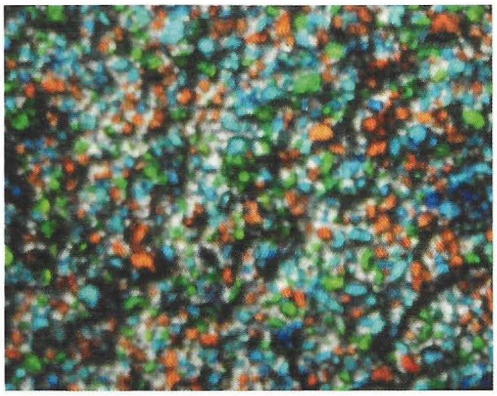
After mixing RGB Ultramarine Blue was too strong. Overcame the green and red. Used Studio Glue Spray as first varnish. Came out looking almost totally blue.

4TH TEST
Red, Green: Art Pigment
Blue: Food Colourant
1st Varnish Studio Glue Spray
2nd Varnish Lukas Spruhfilm
Sub layer coating

Still favoring blue. Better dispersion of colour lattice. Less clumps.

WATER RESISTANCE TEST 1
Small strip of 6 frames with coated lattice put in water for 5 minutes. Starch coating holds well without any colour loss. Good hold up until 45 minures. Left

in water for 1 hour and 20 minutes. Starch solution still holds. Water turned light blue. After looking at strip through magnifying glass the starch grains were bigger. Some water impregnation after prolonged submersion.



DETAIL AUTOCHROME

5TH TEST

RGB Food colourant new distribution
1.5 g of Red and Blue
0.75 g of Green
Sub layer coating
1st Varnish Studio Glue Spray
2nd Varnish Lukas Sprühfilm
2nd Varnish Dammar Oil Paint Varnish
Best colour distribution. Glue spray as 1st Varnish on all strips.

When glue spray is left to set for 2 to 3 minutes before applying RGB starch mix, you obtain more white gaps on the base and more clumping of colours.

Best coating obtained by applying the RGB starch mixture immediately after applying the glue on the base while it's still wet. Apparently when left to set, the glue starts to clump together and gaps form on the base.

Made strips with either Lukas and Dammar varnish as second varnish. Dammar varnish dries slower.

5A Dammar varnish
5B Lucas varnish
5C Lucas (best lattice)

6TH TEST

RGB Food colourant new distribution
1.5 g of Red and Blue
0.75 g of Green
Base side coating

3 strips. Coating done on the base side to leave subbing layer free for panchromatic emulsion.

7TH TEST

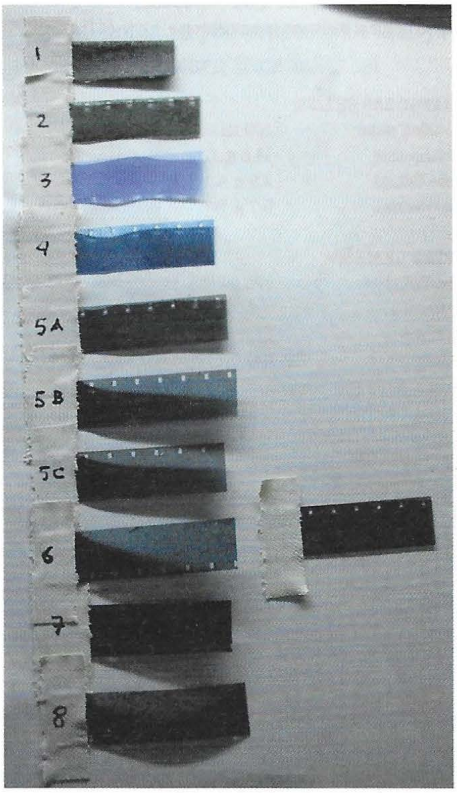
RGB Food colourant new distribution
1.5 g of Red and Blue
0.75 g of Green
Base side coating
Carbon black pigment fill

Carbon black powder added to strip after pressing RGB lattice. Considerably less translucent after adding powder. After pressing a second time, the translucency improved but still quite dark.

BRUSHING AWAY THE EXCESS RGB

8TH TEST

RGB Food colourant new distribution
1.5 g of Red and Blue
0.75 g of Green
Base side coating
2 metre test strip for panchromatic coating. No carbon black fill.



AUTOCHROME TEST RESULTS 1 – 8

FINAL REMARKS:

Lumière Brothers varnish replacement recipes proved to be too difficult and inefficient. Chose to find 21st century replacements for both varnishes. Settled on two spray on varnishes.
1st varnish: spray on glue.
2nd varnish: spray on film.

Lumière Brothers Patent | Photograpic plate for colour photography US 822532 A | http://www.google.com/patents/US822532

See next page for "Appendix: The Orginal Autochrome Process According to the Metropolitan Museum of Art"